CLAIMS

We claim:

1. A method of producing nanostructured $Li_4Ti_5O_{12}$ particles, comprising the following steps:

a) dissolving a lithium containing salt in a liquid solution, preferably an organic solvent,

b) adding a dispersion of nanoparticles of TiO_2; to the liquid solution;

c) heating the liquid solution to facilitate diffusion of lithium ions into the nanoparticles;

d) separating the solids from the liquid solution; and

e) heat treating the solids to form the desired crystal structure.

2. The method as claimed in Claim 1, wherein lithium salt is selected from the group consisting of: lithium nitrate, lithium hydroxide, lithium carbonate, lithium chloride, lithium acetate and lithium iodide.

3. The method as claimed in Claim 1, wherein the organic solvent has a boiling point in the range of 79 – 250° C.

4. The method as claimed in Claim 1, wherein the organic solvent has a boiling point of at least 100° C.

5. The method as claimed in Claim 1, wherein average primary particle size of TiO_2 nanoparticles is in the range of 5 – 100 nm, and the average secondary (or aggregate) particle size is in the range of 25 – 1000 nm.

6. The method as claimed in Claim 1, wherein the heating step comprises refluxing.

7. The method as claimed in Claim 1, wherein the heating step comprises refluxing between 5 to 40 hrs.

8. The method as claimed in Claim 1, wherein the heating step is conducted at an atmospheric pressure in the range of 0.5 to 10 atmospheres.

9. The method as claimed in Claim 1, wherein solid particles are separated from a liquid by at least one of the following methods: filtration, evaporation and centrifuging.

10. The method as claimed in Claim 1, wherein the mixture of a lithium salt and TiO_2 nanoparticles is heat-treated at a temperature in the range of 300 - 900° C.

11. The method as claimed in Claim 1, wherein the mixture of a lithium salt and TiO_2 nanoparticles is heat-treated at a temperature in the range of 600 - 800° C.

12. The method as claimed in Claim 1, wherein the mixture of a lithium salt and TiO_2 is heat-treated for a period in the range of 1 - 24 hrs.

13. The method as claimed in Claim 1, wherein the mixture of a lithium salt and TiO_2 is heat-treated for a period in the range of 2 – 8 hrs.

14. The method as claimed in Claim 1, wherein the mixture of a lithium salt and TiO_2 nanoparticles is heat-treated in an atmosphere containing O_2.

15. The method as claimed in Claim 1, wherein the mixture of a lithium salt and TiO_2 nanoparticles is heat-treated in an atmosphere containing an inert gas. such as, N_2, He or Ar.

16. The method as claimed in Claim 12, wherein the inert gas is selected from the group consisting of N_2, He and Ar.

17. Nanostructed particles of $Li_4Ti_5O_{12}$ produced by the process of claim 1.

18. Nanostructured $Li_4Ti_5O_{12}$ particles, having a spinel type crystal structure and a particle size in the range of 25 – 500 nm; the collection of particles having an average diameter of less than about 300 nm.

19. The nanostructured $Li_4Ti_5O_{12}$ particles in Claim 18, wherein the particles are composed of nano-sized crystals that are between 20 – 100 nm in size.

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